

Locations:

Skin—Face	20
Extremities	6
Mouth	3
Pelvis	12
Abdomen—Gastro-Intestinal Tract	4
Liver	1
Rectum	1
Prostate	2
Chest—Lung	4
Breast	10
Bones	4
Total	67

Treatments:

Surgery	10
Cautery	20
X-ray	9
Radium	3
Palliative	22
None	11
Total	75

Miscellaneous Statistics:

Oldest patient	80 yrs.
Youngest patient	14 yrs.
Average age	56.6 yrs.
Number of deaths	16
Number with metastases	17

ACUTE PERFORATION OF PEPTIC ULCER***AN EVALUATION OF DIAGNOSTIC SYMPTOMS
AND SIGNS**

By HAROLD LINCOLN THOMPSON, M.D.
Los Angeles

DISCUSSION by Wayland A. Morrison, M. D., Los Angeles; Edmund Butler, M. D., San Francisco; E. Eric Larson, M. D., Los Angeles.

THE typical case of acute perforation of peptic ulcer, which is seen early in its course and is complete with a history of previous dyspepsia, characteristic symptoms and classical physical signs, does not present an extremely difficult diagnostic problem. In fact, the diagnosis in typical cases is so easy that a mistake is usually the result of inexperience, haste or oversight on the part of the physician. Despite the ease with which the diagnosis may be made in typical cases, there is a varying proportion of cases which in one or more respects are atypical, and in these the establishment of a working diagnosis is exceedingly difficult. Published figures on the diagnostic error in acute perforation of peptic ulcer indicate that, on the whole, diagnosis is improving with experience in this condition. For example, the error in diagnosis in the series collected by Moynihan¹ in 1901 was as high as 36.7 per cent, whereas in the group published by Poole and Dineen² in 1922 it was only 11.8 per cent. Accumulated experience, moreover, has enabled us to classify the cases of acute perforation of peptic ulcer on the basis of clinical course into several fairly easily recognized groups. The largest group is comprised of the so-called typical cases. There does not appear to be any definite knowledge, however, concerning the size of this group or a consensus of opinion on how large a proportion of cases compose the atypical group. In view of the difficulty in diagnosis in a proportion of cases which generally is

acknowledged to be considerable, this clinical study was undertaken in an effort to determine the relative values of the several subjective symptoms and physical signs which are diagnostic of acute perforation of peptic ulcer.

CLINICAL MATERIAL FOR THIS STUDY

This study was made from the clinical records of five hundred cases of peptic ulcer, complicated by perforation, in which the clinical features were of the acute form. The important clinical features have been evaluated and interpreted in terms of the percentage of cases in which each feature was present. The analysis discloses that the atypical cases vary not only with respect to clinical course, but also with respect to important diagnostic symptoms and signs. That is to say, in addition to the groups which are recognized on the basis of clinical course, there is a remaining group consisting of cases which, in one or more particulars, do not conform to any group now recognized, and in which, therefore, the diagnosis is especially difficult.

**SO-CALLED CLASSICAL CASE OF ACUTE
PERFORATION**

In the so-called classical case of acute perforation of peptic ulcer the history reveals that for some time the patient has been more or less disabled by a characteristic type of recurring dyspepsia. Then suddenly and unexpectedly he is stricken with epigastric pain so severe that it seems beyond endurance. On examination, soon after the onset of pain, the patient's face is pale and moist with perspiration, while his features clearly express his suffering; whereas the respiratory rate is rapid, the pulse is retarded, and the temperature is subnormal. The abdomen is tender throughout. The abdominal muscles are extremely tense, and on palpation they manifest a peculiar quality of rigidity which has been described as board-like. After the pain has persisted for a brief interval, a general condition of prostration, closely resembling shock, supervenes. Unless relieved by massive doses of morphin or by anesthesia and surgical intervention, this clinical picture persists without remission until, after a few hours, the features of diffuse peritonitis appear. Following the supervision of this untoward sequel, death follows in a few days.

METHOD OF STUDY IN THIS ANALYSIS

This study was conducted on the clinical records of the cases of gastric and duodenal ulcer, complicated by perforation, which were observed at the Los Angeles County General Hospital between September 9, 1921, and June 30, 1934. During this period, five hundred patients were observed in whom the clinical features were manifest in the acute form. In 98.2 per cent of the patients the diagnosis of perforated peptic ulcer was confirmed either by operation or by autopsy. Included in the study are nine cases, comprising 1.8 per cent of the total number, in which the history and physical findings were so typical as to exclude all reasonable doubt concerning the clinical diagnosis. On the other hand, patients neither

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CHART 1.—*Chart Containing Important Data Concerning the History of Ulcer Type of Dyspepsia.*

HISTORY OF ULCER DYSPEPSIA As Recorded in 419 Cases	
History	Percentage of Cases
History of ulcer given.....	76.1
History of ulcer denied.....	23.8

operated upon nor examined postmortem, in whom there existed any question regarding the authenticity of the clinical diagnosis, were not included in this study. Most of the patients were seen by a referring physician before admission to the hospital. After admission they were seen by three or more physicians on the hospital staff, including the admitting physician, one or more house physicians and the consulting physician or surgeon, all of whose observations are included in the clinical records. The important diagnostic features obtained from the clinical notes on each case were tabulated for study with respect to four or more points of interest, namely, (1) whether or not the clinical feature was mentioned in the case record, if mentioned (2) whether it was present or (3) whether it was absent, and (4) the degree in which it was manifest when first noted by a practicing physician. From the data compiled in this manner, it has been possible to evaluate on a percentage basis the features of diagnostic importance which are encountered in acute perforation of peptic ulcer.

RESULTS

History of Ulcer Type of Dyspepsia.—The clinical notes in the majority of the cases in this series indicate that inquiry was made into the past

CHART 2.—*Chart Containing Data Concerning the Significant Features of Primary and Referred Pain.*

PRIMARY PAIN (Onset of Pain as Recorded in 455 Cases)	
Type of Onset	Percentage of Cases
Sudden	92.3
Gradual	7.6
(Degree of Pain as Recorded in 481 Cases)	
Degree	Percentage of Cases
Intense	79.8
Moderate	17.4
Mild	2.7
(Location of Pain as Recorded in 476 Cases)	
Location	Percentage of Cases
Upper abdomen	58.4
General abdominal	27.5
Lower abdomen	12.1
Mid-abdomen	1.8
REFERRED PAIN (Region to Which Pain Was Referred as Recorded in 128 Cases)	
Region	Percentage of Cases
Shoulders	89.8
Back	10.1
Thorax	0.0

CHART 3.—*Chart Containing Significant Features Regarding Temperature, Pulse and Respirations.*

TEMPERATURE, PULSE AND RESPIRATION As Recorded in 469 Cases	
Temperature	Percentage of Cases
Normal or subnormal	68.6
Elevated (fever)	31.3
Pulse Rate	Percentage of Cases
Normal or subnormal	74.8
Rapid	25.1
Respiratory Rate	Percentage of Cases
Normal	37.6
Rapid	62.3

history of the patient for the purpose of determining the preëxistence of dyspepsia of the so-called ulcer type (Chart 1). Vague, indefinite or atypical symptoms of dyspepsia were not classed as belonging to the ulcer type. On the contrary, in this study, in order to be accepted as typical of ulcer, it was required that the distress answer the established criteria with respect to location, relation to meals, relief and periodicity, which are characteristic of peptic ulcer. On this basis the patient was questioned concerning ulcer symptoms in 419 cases. It was found that in these cases typical ulcer symptoms had preceded acute perforation of the ulcer in 76.1 per cent. Ulcer symptoms did not precede perforation in 23.8 per cent of cases.

Pain.—The character of the onset of pain was recorded in 455 cases (Chart 2). The onset was described as sudden in 92.3 per cent of cases. From the reports in 481 cases in which the degree of pain was recorded, it was found to be intense in 79.8 per cent, moderate in 17.4 per cent, and mild in 2.7 per cent. The location of the primary pain was recorded in 476 cases. It was situated in the upper abdomen in the largest proportion of cases, namely, 58.4 per cent. In the next largest group, comprising 27.5 per cent of cases, it was distributed generally throughout the abdomen. In 12.1 per cent pain was localized in the lower abdomen, and in the remaining 1.8 per cent, in the mid-abdomen.

Pain referred to distant regions of the body was reported in 128 cases (Chart 2). It was referred to one or both shoulders in 89.8 per cent, and to the back in 10.1 per cent, but it was not referred to the thorax in any of the cases.

Temperature, Pulse, and Respirations.—The degree of the temperature and the rates of the pulse and respiration of the patients on admission to the hospital were recorded in 469 cases (Chart 3). The temperature was normal or subnormal in 68.6 per cent of cases, whereas fever was present in but 31.3 per cent. Normal or subnormal pulse rate was present in 74.8 per cent of cases, whereas rapid pulse rate was present in only 25.1 per cent. In contrast to these, the respiratory rate was accelerated in 62.3 per cent of cases.

CHART 4.—Chart Containing, for Comparison, Important Data Concerning the Existence of Shock as Determined by the General Appearance of the Patients, and by Blood Pressure Readings.

SHOCK	
Based on the Appearance of the Patients As Recorded in 92 Cases	
Appearance of Shock	Percentage of Cases
Present	72.8
Absent	27.1
Determined by Blood Pressure Readings As Recorded in 364 Cases	
Blood Pressure	Percentage of Cases
Subnormal (shock)	19.2
Normal or above	80.7

Shock.—In the literature, as well as in clinical records, shock frequently is mentioned as a prominent feature in acute perforation of peptic ulcer. The term usually is employed loosely to describe the general appearance of the patient whose skin is pale, moist and cold, without special reference to the patient's blood pressure. In order to illustrate the discrepancy between the loose and the strict use of the term "shock," a comparison was made between the number of cases in which, on the basis of appearance, it was recorded as present, and the number in which it was found to be present, on the basis of blood pressure determinations. Employed in the loose sense, shock was mentioned in the records of ninety-two cases (Chart 4). In 72.8 per cent of these cases it was recorded as present. The blood pressure was taken on admission in 364 cases. It was found to be normal or above in 80.7 per cent of cases, and subnormal in but 19.2 per cent. These results indicate, therefore, that when shock is said to be present in a given case of acute perforation of peptic ulcer, it must not be accepted as being present until the criteria by which it was determined are scrutinized.

Abdominal Rigidity.—The degree of rigidity of the abdominal muscles was noted in 449 cases (Chart 5). In 69.3 per cent it was described as of extreme degree. Moderate rigidity was present in 23.4 per cent, and slight rigidity in 7.1 per cent of the cases.

Liver Dullness.—Mention of examination of the thorax and abdomen for modifications in the normal area of liver dullness was made in 147 cases in this study (Chart 5). Absence or diminution of liver dullness was detected, however, in only 25.1 per cent of the cases in which it was mentioned.

Leukocyte Count.—The leukocyte count of the blood was recorded in 345 cases in this series (Chart 6). The count was high in 84.3 per cent of cases, and normal or low in 15.6 per cent.

Intraperitoneal Air.—While it is of considerable confirmatory value in the diagnosis of perforated hollow viscus, roentgenologic examination of the abdomen, for free intraperitoneal air, was

CHART 5.—Charts Containing Essential Data Concerning the Rigidity of the Abdominal Wall and the Modifications of Liver Dullness.

RIGIDITY OF ABDOMINAL WALL As Recorded in 449 Cases	
Degree	Percentage of Cases
Extreme	69.3
Moderate	23.4
Slight	7.1
MODIFICATIONS IN LIVER DULLNESS As Recorded in 147 Cases	
Liver Dullness	Percentage of Cases
Diminished or absent	25.1
Unmodified	74.8

conducted in a very small proportion of cases in this series (Chart 6). Of the thirty-five cases in which it was performed it was present in 42.8 per cent.

COMMENT

In this paper the effort has been made to ascertain the broad clinical features of diagnostic importance in acute perforation of peptic ulcer, and to determine their relative value. The classification of cases, with respect to type, stage or degree of severity, must be deferred for a later communication.

History of Ulcer Type of Dyspepsia.—This study has revealed the proportion of cases in which prior to perforation dyspepsia of the ulcer type existed. Its presence in 76.1 per cent of cases indicates that it is available as a diagnostic aid in three out of four cases, provided questioning of the patient is pursued with regard to situation, relation to meals, relievability and periodicity of distress sufficiently to differentiate it from other types of dyspepsia. This figure is large enough to emphasize its importance as a clue in diagnosis. On the other hand, its absence in a proportion of cases as great as one in four, is sufficient to impress one with the fact that in the presence of other convincing symptoms perforation cannot be excluded in a given case simply because a history of ulcer dyspepsia is lacking.

Pain.—The present study confirms the prevailing impression that pain is the most important, as well as the most prominent symptom in acute

CHART 6.—Charts Containing Data Concerning the Significant Laboratory Findings.

LABORATORY FINDINGS LEUKOCYTE COUNT As Recorded in 345 Cases	
Leukocyte Count	Percentage of Cases
High (leukocytosis)	84.3
Normal or low	15.6
FREE INTRAPERITONEAL AIR As Recorded in 35 Cases	
Free Intraperitoneal Air	Percentage of Cases
Present	42.8
Absent	57.1

perforation of peptic ulcer. The fact that one or more features of the pain were mentioned, in so large a proportion as 96.2 per cent of cases, is in itself significant of its importance. While the onset, location, degree, and region of reference are four important characteristics of the pain, the study indicates that the features which chiefly distinguish the pain in perforated ulcer, from that produced by other causes, are the suddenness of the onset and the intensity of the degree. Whereas, in a few instances, the onset of pain is heralded by minor premonitory symptoms, in 92.3 per cent of cases the onset is so sudden and occurs with so little warning, that the patient, prior to the appearance of pain, considers himself in usual health and continues to occupy himself with his normal activities. Common terms which patients use in describing the quality of the pain are bursting, cutting or piercing, while they characterize it as terrible, agonizing or intolerable in degree. In addition, the study discloses that the location of the pain is never pelvic; that in a small percentage of cases it is mid-abdominal, in a somewhat larger proportion of cases it is lower-abdominal, and in a still larger proportion it is general throughout the abdomen, whereas, in the largest percentage, it is upper-abdominal or epigastric. Rarely pain is referred to the back, but the study discloses that when referred pain is present it is referred to the shoulders in 89.8 per cent of cases. These are points to be borne in mind in differentiating perforated ulcer from acute appendicitis, cholecystitis or cholelithiasis. Thus a study of the characteristics of the pain is a valuable aid in differentiating the diseases which are most commonly confused with perforated peptic ulcer.

Temperature, Pulse, and Respiration.—The reactions of the temperature of the body, the pulse and respiration to acute perforation of peptic ulcer are perhaps the most deceiving of any of the clinical signs. Acute appendicitis, in contradistinction, usually is associated with slightly elevated temperature and pulse rate, but not necessarily an increase in respiratory rate. After the appearance of extensive peritonitis as a complication of perforation, the reactions typical of some of the other acute intra-abdominal conditions are manifest. According to the results of this study, if the physician were to defer his diagnosis of acute perforation until the type of reaction appears which is seen in other acute conditions within the abdomen, either he would be in error in from 62 to 75 per cent of cases, or he would be responsible directly for unnecessary delay in the application of treatment.

Shock.—In the early stage of acute perforation of peptic ulcer many of the superficial features noted closely resemble shock. These features include pallor, cold, moist skin and subnormal temperature. Whereas these features usually are present in shock, they are not the important criteria of the existence of that condition. As is well known, surgical shock is essentially a condition of subnormal peripheral circulation, the chief index of which is low blood pressure. As the present study indicates, surgical shock *per se* is not present in the early stages of acute perfo-

ration of peptic ulcer. In complicating general peritonitis, however, the supervention of surgical shock takes place as a late condition of the utmost gravity.

The features which are misleading in regard to the presence of shock may be explained on a different basis from that which obtains in surgical shock. Owing to the absence of diaphragmatic and abdominal breathing, and notwithstanding the compensatory rapid rate of thoracic respiration, the pallor or livid color of the skin is a direct result of incomplete aeration of the blood. Thus in acute perforation of peptic ulcer the pallor is respiratory, whereas in surgical shock it is circulatory. The subnormal temperature of the body results from the cooling effect of the excessive perspiration. In early acute perforation an increase in metabolism, with its increased generation of heat, is not present. Since evaporation is a cooling physical process, and since there is no increase in body heat, the temperature of the body necessarily must fall below normal. In these cases, therefore, excessive perspiration does not have the usual heat regulating significance which obtains in the normal physiologic state. Rapid pulse, which is a prominent feature of surgical shock, by contrast is shown through this study not to be present in typical early acute perforation.

These important facts are borne out despite the inclusion in this study of cases in the late stages of general peritonitis. An investigation of shock was included in order to emphasize the fact that, with reference to acute perforation of peptic ulcer, the term is commonly misused. From the results of this phase of the study, the distinction is clearly drawn between shock, as the term is applied loosely to the general appearance of the patient, and as it is properly used according to established clinical criteria.

Abdominal Rigidity.—The most striking observation to be made on physical examination of the patient with acute perforation of peptic ulcer is the rigidity which is manifest by the abdominal wall. Everywhere the muscles are characteristically firm and nonresilient. The resistance which they offer to the palpating hand is of a peculiar wood-like firmness, hence the application of the descriptive term "board-like." This taut condition of the muscles is involuntary, unrelenting, and obstinate. It does not relax with the respiratory movements because, as pointed out above, respiration is exclusively thoracic.

Liver Dullness.—A sign, which occasionally is to be found on examination, is diminution or obliteration of the normal liver dullness. The objection has been raised that, when present, this sign is not pathognomonic of perforated ulcer. However, since the normal dullness of the right lobe of the liver is constant and easy to determine, any marked modification in it should be a helpful diagnostic aid. The modifications in liver dullness are caused by the escape of air into the peritoneal cavity. On rising to the dome of the diaphragm, the air forms a tympanic layer between the liver and the body wall. If this sign were looked for in every patient with a suspected perforated peptic

ulcer, probably it would be found in only a small proportion of cases. It is, nevertheless, a valuable confirmatory diagnostic sign when present.

Laboratory Findings.—Whereas in the past the leukocyte count was relied upon greatly in the diagnosis of acute conditions in the abdomen, it currently is believed to be of less value because the information which it yields is not specific for any given disease. Provided coexisting causes of leukocytosis can be ruled out in a given case, the leukocyte count may be of value in differentiating noninfectious conditions, such as tabetic crisis or renal colic.

Free intraperitoneal air, demonstrable by x-ray, like diminution of normal liver dullness, while not pathognomonic of perforated peptic ulcer, is a valuable sign when present, and when the question of differentiating perforation of hollow viscus from other causes does not exist.

SUMMARY AND CONCLUSIONS

In the present analysis of the subjective symptoms and physical signs recorded in five hundred cases of perforation of peptic ulcer observed in the acute stages, the clinical features are found to fall into two general groups: first, those which are of primary diagnostic importance, and second, those which are of secondary or confirmatory value in diagnosis. The features of the first group are found to have been deemed worthy of record at the time the clinical notes were made in approximately 90 per cent of cases. The features are, in the order of their value, sudden pain, severe pain, a history regarding preëxistence of ulcer type of dyspepsia, and extreme rigidity of the abdominal musculature (Chart 7). When it is revealed, moreover, that the positive or significant aspects of these features were observed in approximately 70 per cent of cases, their importance is enhanced.

The features of the group of symptoms of secondary or confirmatory value were recorded in percentages of cases ranging from 7.0 to 93.8 per cent. In the order of their value, these features are: pain referred to the shoulder, leukocytosis, normal or subnormal temperature and pulse, roentgenologic evidence of free intraperitoneal air, and modified liver dullness. The fact that these are positive or otherwise significant in as high as 89.8 per cent of cases—as, for example, pain referred to the shoulder—is indicative of their importance as confirmatory features. On the other hand, the fact that a confirmatory sign is present in only 25.1 per cent of cases—as, for example, diminished liver dullness—does not detract from its importance when it is present.

On recapitulation, it may be said that there exists, in cases of acute perforation of peptic ulcer, a clinical picture which is typical and characteristic. In nearly 90 per cent of cases the history, pain and rigidity of abdominal muscles are worthy of note. In nearly 70 per cent of cases these features are positive or, in addition, are manifest in so marked a degree as to be of primary diagnostic significance. Not to be overlooked, how-

CHART 7.—Charts Containing Data Concerning Primary and Secondary Diagnostic Features. The Left Column Contains the Significant Aspects of the Diagnostic Symptoms and Signs. The Middle Column Contains the Number and Percentage of Cases in Which Notes Regarding the Symptoms or Signs Were made in the Records. The Right Column Contains the Percentage of Cases in Which the Feature Was Present.

DIAGNOSTIC FEATURES			
PRIMARY DIAGNOSTIC FEATURES			
Symptom or Sign	Cases in Which Recorded		Percentage of Cases in Which Present or Marked
	Number of Cases	Percentage of Cases	
Pain:			
Sudden	455	90.1	92.3
Severe	481	96.2	79.8
History re ulcer	419	83.8	76.1
Abdominal rigidity	449	89.8	69.3
CONFIRMATORY DIAGNOSTIC FEATURES			
Referred pain	128	25.6	89.8
Leukocytosis..	345	69.0	84.3
Temperature and Pulse:			
Normal or subnormal	469	93.8	68.6 to 74.8
Intraperitoneal air	35	7.0	42.8
Liver dullness	147	29.4	25.1

ever, is a second fact disclosed by this study, namely, that none of the individual primary or secondary symptoms or signs are present in 100 per cent of cases. In a single given case, therefore, it theoretically is possible for the clinical picture to be composed entirely of symptoms and signs which, statistically, are of rare occurrence. A composite clinical picture of such a case would be not unlike the average case of acute appendicitis which, as has been suggested, is the condition most commonly confused with acute perforation of peptic ulcer. It is apparent, therefore, that in the diagnosis of acute conditions within the abdomen, acute perforation of peptic ulcer always must be considered as a possibility, so that operative procedure can be planned in such a way as to enable the surgeon to deal with it in case it is found to be present.

1930 Wilshire Boulevard.

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DISCUSSION

WAYLAND A. MORRISON, M. D. (523 West Sixth Street, Los Angeles).—A statistical study of a large number of cases, such as Doctor Thompson has described, is of prime importance and can only be obtained in a large general

hospital. This aptly illustrates the importance of careful history notes even in cases of severe emergencies.

The clinical picture of ruptured ulcer is usually, as he has shown, fairly diagnostic. There are cases, however, which simulate other acute conditions. At autopsy in these cases, it is not uncommon to find that death was caused by peritonitis from ruptured peptic ulcer and that the secondarily inflamed appendix had been removed because it was thought to be the origin of the peritonitis. It behooves the surgeon, therefore, to make an incision which provides adequate exposure and which can be enlarged easily. In my opinion, small, muscle-splitting incisions should never be used in the so-called "acute abdomen."

Doctor Thompson states that almost 24 per cent of this series did not give a previous history of ulcer. In my own series, I believe this per cent is much higher. It is apparently the acute, fulminating ulcer that perforates.

Another condition which occasionally gives the same typical picture Doctor Thompson described, and which should be kept in mind, is an atypical case of coronary thrombosis. It is a patient of this type who will sometimes die on the operating table before or during the operation.

Statistical studies of this type, especially in the larger institutions, should be encouraged. The data are accurate, educational, and of great aid in the proper diagnosis of future cases.

✱

EDMUND BUTLER, M.D. (490 Post Street, San Francisco).—Doctor Thompson has presented a carefully prepared paper and has accurately evaluated the symptoms. The percentages given, I feel, will hold in any series of cases where peptic ulcer has the general characteristics, as is found in this part of the world. The extensive indurated type of peptic ulcer frequently occurring in Central Europe may give different symptom percentages.

Those of us who are more or less familiar with the intra-abdominal catastrophes hope always to keep mindful of the bizarre picture resulting from a perforation of a chronic peptic ulcer when many adhesions are present. The typical picture of perforated peptic ulcer seldom fails to create anxiety on the part of all concerned. There is often a feeling of well-being by the patient, with beginning septic peritonitis, occurring four to six hours after perforation. This period is marked by the greatest dilution of escaped gastric contents by a profuse peritoneal exudation. This apparent improvement is often misleading to the physician.

Some arrangement should be made for giving a greater number of doctors and medical students the opportunity to observe and examine acutely ill patients of this type. So often these patients enter the county hospital late at night, and only the interne and the resident on the service are privileged to examine and diagnosticate.

I have often stressed the taking of an upright film in all patients presenting an intra-abdominal catastrophe. Not infrequently free air is discovered, and leads to a diagnosis of a perforated ulcer where, up to that time, an ulcer had not been suspected. Free air is present in a variable number of cases, possibly 65 per cent, but is a positive finding, and precludes watchful waiting and prolonged discussion.

✱

E. ERIC LARSON, M.D. (1930 Wilshire Boulevard, Los Angeles).—The essayist has done a large amount of work in gathering statistics relative to the more accurate diagnosis of acute perforation of peptic ulcer, a complication that, without question, demands immediate and accurate diagnosis and no delay in surgical interference.

The primary diagnostic features are those of sudden severe pain, with an unmistakable rigidity of the abdominal muscles; and in 76 per cent of cases an antecedent history of peptic ulcer, as shown by Doctor Thompson. There are several intra-abdominal catastrophes to which these cardinal symptoms are prominently attached. Some instances of ruptured appendicitis and the bite of the *Latrodectus mactans* spider, as well as acute perforation of the gall-bladder with choleperitoneum, must be differentiated from this condition.

Doctor Thompson has compiled statistics relative to the confirmatory diagnostic features, which, if rigidly studied and studiously applied, eliminates the factor of error in the diagnosis in a very high percentage of cases. The leukocytosis, which in 84.3 per cent of cases, as Doctor Thomp-

son's statistics show is high, and the referred pain spoken of in the essay with the x-ray evidence of intraperitoneal air bubble, should all assist in making a proper diagnosis.

✱

DOCTOR THOMPSON (Closing).—In the light of their clinical experience, the observations made by the discussers of this paper emphasize the practical value of certain statistical findings of this report. As is well known, a matter of frequent comment among surgeons who deal with these cases is that a considerable number of acute perforations occur in patients who do not give a history of previous ulcer symptoms. Prior to making this study, my own impression, to the effect that this situation obtained in more than 24 per cent of cases, was in agreement with that expressed by Doctor Morrison. It is very illuminating, therefore, to ascertain from this study that a history not merely of dyspepsia, but of dyspepsia possessing the location, relation to meals, periodicity, and relievability, which is characteristic of peptic ulcer, was obtained in so large a number as 76 per cent of cases.

Doctor Butler's remark regarding the value of intraperitoneal air in diagnosis also is well taken. I regret that this valuable diagnostic sign was not utilized in more than thirty-five cases in this study. However, it is significant that it was positive in 43 per cent of the cases in which it was used. Doctor Morrison's mention of coronary thrombosis and Doctor Larson's reminder that perforative appendicitis, poisoning from the bite of the black widow spider, and perforation of the gall-bladder with choleperitoneum should not be overlooked in differential diagnosis, are all valuable additions to this paper.

THE TRAUMATIC STATE*

By EDMUND BUTLER, M.D.
San Francisco

DISCUSSION by Alanson Weeks, M.D., and G. D. Delprat, M.D., San Francisco; H. S. Chapman, M.D., Stockton.

DURING the last fiscal year, 67,048 patients were treated in the San Francisco Emergency Hospitals, 47,376 of these being surgical. Of the entire group, 13.7 per cent were classified as having extensive and severe injuries. The complete diagnosis in cases of multiple injuries is very difficult. The injury that for a time does not give recognizable symptoms, or in which symptoms may have been overshadowed by the more remarkable symptoms of the other injuries, may cause the patient's death. Because of the multiplicity of injuries, it becomes necessary for traumatic surgeons to know something about head injuries, thoracic injuries, abdominal injuries, and injuries of the extremities.

TRAFFIC ACCIDENTS

A recent English survey of automobile accidents showed that there were twice as many accidents in the cities as occurred in the country, but that there were twice as many deaths in the country as occurred in the city. This was attributed to the speed of the automobiles at the time of the accident. In 1934 there were over 36,000 deaths from traffic accidents in the United States. It is my opinion that many lives may be prolonged by judicious surgery performed by intelligent courageous surgeons.

Extradural Hemorrhage.—Le Conte reported five hundred autopsies following deaths from head

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